



Equivalence of Online Remote Versus Traditional In-Person Administration of the Feifer Assessment of Reading Screening Form

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INTRODUCTION

As educators and psychologists rely more on technology while navigating the digital world, we must adapt existing psychological assessment tools and create new ones for in-person and online remote administration. PAR is committed to doing everything we can to continue to help you serve your clients and recognize the increasing need for digital assessment options. We offer a library of online rating scales through our PARiConnect platform, which have become very prevalent in the field. Within PARiConnect, our Digital Library houses e-manuals for our products. More recently and due to increasing demand, we have also been providing digital materials that offer flexibility in administration format (e.g., on-screen vs. paper-and-pencil). Through our continued development of e-stimulus books, we have addressed concerns about the cleanliness of paper stimulus books and helped reduce the amount of physical materials needed for administration (i.e., e-stimulus books on a single device vs. multiple paper stimulus books). We've developed e-stimulus materials for both in-person administration and remote administration ([see our administration guidelines for more information](#)).

Individual testing, a major part of psychoeducational assessment, is often time-intensive; it can be challenging to schedule in-person sessions given pandemic-related restrictions on student capacity in buildings. Online remote testing is a convenient and safe way to assess individuals. Because there are now multiple cognitive measures available for online remote assessment, there's a need for additional academic, performance-based tests that can be administered remotely. To that end, PAR developed a process for conducting remote administration of the Feifer Assessment of Reading (FAR) Screening Form (Feifer & Gerhardstein Nader, 2015). Our current study evaluates the equivalence between online remote administration and traditional in-person administration of the FAR Screening Form for children between the ages of 4 and 21 years. The goal is to evaluate the scatter of scores captured by both administration formats (with matched participants based on demographics) in order to determine if the formats are interchangeable and congruent.

The FAR Screening Form was designed to identify children at risk for developmental dyslexia and to measure the underlying processes of reading in a manner that best informs decisions about appropriate interventions. The screener comprises three subtests: one from the Phonological Index (Phonemic Awareness [PA]), one from the Fluency Index (Rapid Automatic Naming [RAN]), and one from the Comprehension Index (Semantic Concepts [SC]). We selected these subtests as the best representation of each index based on clinical research

and statistical acumen. For instance, the PA subtest provides examiners with the ability to measure how efficiently a student can identify, blend, segment, and manipulate phonemes. The temporal ordering of phonological information is often a major pitfall among dyslexic learners because poor phonological processing in the early years leads to inefficient neural mappings between letters and sounds in the later years (Hulme & Snowling, 2016). Similarly, the RAN subtest was selected as the best representation of the Fluency Index because skilled readers tend to use orthographical cues to activate quicker and more automatic pathways sensitive to the visual word form (Katzir, 2009). Last, the SC subtest was selected as the best representation of the Comprehension Index because of its robust language demands. These three subtests can be administered in approximately 15–20 minutes, and their content is consistent in scope with the current definition of dyslexia as outlined by the [International Dyslexia Association \(2002\)](#):

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

The FAR Screening Form yields a single composite score that indicates risk for dyslexia. The instrument is intended to assist users in deciding whether the risk of dyslexia or reading disability is high enough to warrant further assessment.

Many factors involved with the administration of any assessment can affect the examinee's performance, such as motivation, room conditions, and distractions. We took into account several factors before considering converting traditional, in-person, paper-and-pencil test administration materials and format to a remote administration format. For example, the interactions between the examiner and examinee through a videoconferencing platform, technology challenges, and the alteration from a physical stimulus book to a digital format may influence the examinee's responses. Therefore, we felt it necessary to examine whether FAR Screening Form results are equivalent in these two administration formats. This study provides psychometric evidence that these two testing methods (i.e., in-person paper-and-pencil vs. remote) are generally equivalent.



FIDELITY REQUIREMENTS

The FAR Screening Form online remote administration data were collected under specific conditions, which are listed in this paper. Results of this study are only generalizable to testing situations that adhere to the fidelity requirements described. Other types of online remote administration of the FAR Screening Form have not been evaluated for their potential equivalence to traditional in-person administration. Therefore, practitioners should administer the FAR Screening Form remotely only under standardized conditions.

PHYSICAL CONDITIONS

Remote administration of the FAR Screening Form took place in a quiet room with no distractions where the examinee was seated in front of a laptop, desktop computer, or tablet with a viewable screen measuring at least 9 inches diagonally through which the examinee verbally and visually communicated with the examiner, who was located in a separate quiet room with no distractions. A high-definition camera was set up so that the examinee's face and desk/work space were visible to the examiner and the examinee could see the examiner's face and digital materials via the digital platform on the screen. The examinee, examiner, and proctor (when utilized) had a headset with a microphone. When using a desktop or laptop computer, the examinee had a mouse to indicate response choices on the screen, if desired. The proctor, who remained in the room (only with examinees younger than 10 years) seated behind the examinee, redirected the examinee as indicated by the examiner. The examiner followed all standardized administration instructions.

DIGITAL PLATFORM AND DIGITAL STIMULUS

The FAR Screening Form stimulus book was converted to an e-stimulus book for use on a digital videoconferencing platform. Careful consideration was given to the fidelity of the images and text on all subtests. In order to maintain accurate presentation of the stimuli, we required both displays (i.e., examiner's and examinee's) to have at least 800 × 600 pixels of resolution quality and a minimum 9-inch diagonal view. The audio was transmitted through the platform (versus other means like a conference phone) to ensure clarity and quality. The examinee used a headset.

We required a video integration system that allows the examiner to administer the assessment tool and annotate while sharing the e-stimulus book. For this study, examiners and examinees used Zoom, WebEx, or GoToMeeting. Each platform required the examiner to log in and "admit" the examinee into the test administration session. Test security was maintained as each examiner opened the e-stimulus book and then shared the screen for examinees to view the items. After they were given instruction guides on how to use the e-stimulus books with the platform, examiners completed a technology check with PAR staff as needed before administering assessments.



EXAMINER TRAINING

In order to participate in this study, all examiners were required to have previous training and skill in psychological assessment procedures and familiarity with measurement theory and the psychometric concepts of reliability and validity. All examiners for this study were school psychologists or clinical psychologists with previous knowledge and experience administering the FAR Screening Form or similar assessments in the traditional in-person format. Some examiners also had previous experience completing online remote assessments.

All examiners received training in how to set up the assessment session. Examiners were required to verify that participants had a proper, stable internet connection to be included in the study. Examiners not familiar with remote assessments underwent additional, specific training provided by PAR staff. This consisted of a video to familiarize the examiner with remote assessment, instructions on how to use the e-stimulus book,

and individual practice and feedback sessions as needed.

Prior to the administration of the online remote FAR Screening Form, examiners refamiliarized themselves with all facets of the instrument, including start and stop rules, test instructions, scoring guidelines and procedures, and appropriate word pronunciations.

PROCTOR TRAINING

Children younger than 10 years had a proctor available (e.g., parent, caregiver, teacher) to assist with computer setup and assure they remained on task. The proctors were recruited and trained by the examiners. Proctors reviewed an introductory document about the project, and examiners coached them on when they were allowed to speak to examinees. For example, proctors were prohibited from providing the student with direct or indirect feedback. Proctors sat behind the student so they would not interfere with the testing session.

EQUIVALENCE STUDY DESIGN

To reduce confounding factors, this study used a demographically corrected normative comparison. Examinees were paired by age, gender, education, and ethnicity. They completed the remote FAR Screening Form subtests and were then demographically matched with examinees from the FAR standardization sample, who had taken the traditional FAR Screening Form. The two separate samples (in-person and remote) were equal in number and, because of the matching, should be comparable on potentially confounding variables and general cognitive ability.

For the purposes of this study, both significance tests (p values of t -tests) and effect sizes (Cohen's d and omega squared [ω^2])

were calculated to determine if there were significant effects for administration procedure. Cohen's d , which measures the mean differences between two groups, was selected because t -tests were used and the two groups had similar standard deviations and were the same size (Kotrlík et al., 2011). Omega squared, another way to measure effect size, was also selected as it uses unbiased measures of the variance components and is appropriate for small sample sizes (Olejnik & Algina, 2003). The standards of $p \geq .05$, Cohen's $d \leq 0.30$ (Cohen, 1988; Daniel et al., 2014; Wright & Raiford, 2020), and $\omega^2 \leq .03$ (Button et al., 2013; Cohen, 1992; Wright, 2018) were selected as cutoff criteria for a significant effect of the administration type.

FAR SCREENING FORM EQUIVALENCE STUDY

PARTICIPANTS

PAR used known examiners to recruit a sample of 70 examinees ages 4 to 21 years for online remote administration of the FAR Screening Form. Payment was provided to all examiners.

Parental consent was granted for all participants younger than 18 years. All participants were fluent in English. Participants were excluded from the study if they presented with hearing or visual impairments that would preclude online assessment or had a diagnosis of a specific learning disability, attention-deficit/hyperactivity disorder (ADHD), or another condition that may impact academic progress.

Each examinee was matched with an examinee of the same gender, age, race, and education level from the standardization sample, resulting in 140 total examinees. Demographic characteristics of the sample are presented in [Table 1.1](#). Overall, males and females were equally represented. In terms of race and ethnicity, the current sample compares to 2020 U.S. Census proportions (U.S. Census Bureau & U.S. Bureau of Labor Statistics, 2020), with Blacks being comparable, Whites being underrepresented (versus census data of 64%), and Hispanic and other races/ethnicities being overrepresented (versus census data of 14% and 7%, respectively). Other races/ethnicities included American Indians, Alaska Natives, Asian Americans, Pacific Islanders, and any other group not classified as White, Black, or Hispanic.

Table 1.1. Demographic Characteristics of the FAR Screening Form Traditional and Remote Administration Samples

Demographic characteristic		Administration format			
		Traditional in-person		Online remote	
		Number of participants			
		70		70	
		Male	Female	Male	Female
Age (years)	4–7	9	9	9	9
	8–12	12	11	12	11
	13–17	5	11	5	11
	18–21	8	5	8	5
	M	11.74		11.74	
	SD	4.93		4.93	
		Male	Female	Male	Female
Grade	PK–Grade 2	10	10	10	10
	Grades 3–8	13	12	13	12
	Grades 9+	11	14	11	14
Race/ethnicity	White	40%		40%	
	Black	13%		13%	
	Hispanic	24%		24%	
	Other ^a	23%		23%	
Parent education	Less than high school graduate	2%		0%	
	High school graduate	24%		26%	
	Some college	24%		24%	
	College graduate	50%		50%	

^a Includes American Indians, Alaska Natives, Asian Americans, Pacific Islanders, and any other group not classified as White, Black, or Hispanic.



PROCEDURE

Remote administration. Data for remote administration were collected between October 2020 and January 2021 using 18 examiners who tested examinees in 11 states: Alabama, California, Florida, Georgia, Idaho, Kansas, Maryland, New York, Oregon, South Dakota, and Texas.

All FAR Screening Form remote test administrations occurred between two rooms in different homes or buildings or between two rooms in the same home or building. The FAR Screening Form was administered according to the procedures specified by PAR.

We provided examiners with instructions on how to complete each remote administration and mailed print copies of the FAR Professional Manual to them for additional administration and scoring guidance. Examiners completed a participant enrollment form, which asked for the examiner's site and examinee's demographic information. Examiners were then paid to verify proper internet connection with the examinee; during this setup session, they obtained consent and background information from the examinee. The setup and testing sessions occurred via Zoom, GoToMeeting, or WebEx.

During the testing session, the examiner followed the remote administration instructions (Feifer & PAR Staff, 2021) and used the FAR Screening Form e-Stimulus Book. For example, on the Rapid Automatic Naming (RAN) and Semantic Concepts (SC) subtests, the examiner used the screen share feature to present and administer all items in the e-stimulus book, and the examinee provided a verbal response. Additionally, on the SC subtest, the examinee had the option to respond nonverbally through the use of a drawing tool, if preferred.

Remote administration procedures for each Phonemic Awareness task varied. On the Phonemic Awareness: Rhyming (PA:R) task, the examiner used the screen share feature to present and administer items 1–14 in the e-stimulus book, and the remaining items were presented verbally without an e-stimulus book. The examinee provided a verbal response to all items.

On the Phonemic Awareness: Blending (PA:B) and Phonemic Awareness: Segmenting (PA:S) tasks, the examiner presented all items verbally, and the examinee provided a verbal response.

On the Phonemic Awareness: Manipulation (PA:M) task, the examiner used the screen share feature to present and administer items 1–6 in the e-stimulus book, and the remaining items were presented verbally without an e-stimulus book. The examinee provided a verbal response to all items. Additionally, for items 1–6, the examinee had the option to respond nonverbally through use of a drawing tool, if preferred.

For all subtests, examiners used paper record forms to read the administration instructions and record responses, along with confirming and recording the participant's demographic information.

When the testing session was complete, examiners scored the protocol by totaling the raw scores for each scale and using the normative look-up tables in the FAR Professional Manual to find and record the grade-adjusted standard scores. At this time, examiners also verified the examinee's demographic information and asked whether there were any issues with the session. Because the FAR Screening Form is a published assessment, results were made available to participants or parents of participants on request. Examiners mailed the completed protocols and examinee enrollment forms to PAR, where staff reviewed each protocol and, if necessary, resolved administration and scoring errors. Examiners were paid for each completed case.

Examinees and examiners were required to confirm they completed the assessment in a quiet room using a headset with a microphone on a desktop computer, laptop, or full-sized tablet. In addition, examiners were required to indicate they followed standardized administration instructions and to note the device they used to administer the test, the videoconferencing platform they used, and any technical difficulties. Finally, examinees who were older than 10 years confirmed they were in the room by themselves.

Matched sample. Data from the FAR Screening Form in-person standardization sample were matched with those from the FAR Screening Form remote administration sample on age, gender, ethnicity, and parent education. For more information about the FAR standardization sample and procedures, refer to the FAR Professional Manual (Feifer & Gerhadstein Nader, 2015).

RESULTS

The means and standard deviations of all FAR Screening Form subtest and index standard scores for each administration format and for the total sample are presented in [Table 1.2](#).

Table 1.2. Descriptive Statistics for FAR Screening Form Test Scores by Administration Format

	Traditional in-person administration		Online remote administration		Total sample	
Subtest/index score	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Phonemic Awareness (PA)	102.39	17.74	98.84	16.05	100.61	16.95
Rapid Automatic Naming (RAN)	100.00	14.33	94.41	15.00	97.21	14.88
Semantic Concepts (SC)	101.01	16.86	102.90	19.02	101.96	17.93
FAR Screening Index (SI)	101.76	14.84	98.79	15.35	100.27	15.12
<i>N</i>	70		70		140	

Note. All subtest and index scores are standard scores ($M = 100$, $SD = 15$).

Independent-samples *t*-tests were conducted to determine if there were differences in scores between the traditional in-person and online remote formats. [Table 1.3](#) shows the comparisons between administration formats, both with hypothesis testing (*t* and *p* values) and effect sizes (Cohen's *d* and omega squared). There was no significant effect of administration format for scores on the PA or SC subtests or the FAR Screening Index (SI). However, the Rapid Automatic Naming (RAN) subtest showed a significant effect for administration format—scores obtained during traditional in-person administration were significantly higher (100 ± 14.33) than scores obtained during online remote administration (94.41 ± 15). We hypothesize the difference in performance

to be due to some distractions, as examiners have less control in the online remote environment than they do in the traditional in-person setting. Slower internet speeds have been linked to lower test scores in videoconferencing environments ([Gentry et al., 2019](#)); the RAN is a speeded subtest, and these results are consistent with other speeded processing tasks. For example, Speeded Processing Index scores obtained during traditional in-person administration of the Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2) were significantly higher than scores obtained during online remote administration ([Wright, 2018](#)). Last, the examinee's ability to identify large amounts of information when scanning a digital screen versus a traditional test booklet may differ.

Table 1.3. Significance and Effect Size of Administration Format on FAR Screening Form Subtest and Index Scores

	Effect size			
Subtest/index	<i>t</i>	<i>p</i>	Cohen's <i>d</i>	ω^2
Phonemic Awareness (PA)	-1.239	.217	0.204	.004
Rapid Automatic Naming (RAN)	-2.253	.026	0.381	.028
Semantic Concepts (SC)	0.621	.536	0.105	-.004
FAR Screening Index (SI)	-1.164	.246	0.197	.003

Note. A positive effect size indicates higher scores with traditional in-person administration ($N = 140$).

Because of the significant effect size of administration format on RAN, we created a new screening index that includes only the PA and SC subtests—the FAR Screening Remote Index (SRI). The SRI yielded strong correlations of .82 with the FAR Total Index and .93 with the FAR Screening Index. The means and standard deviations of the standard scores for the PA and SC subtests and the SRI for each administration format and for the total sample are presented in [Table 1.4](#). [Table 1.5](#) shows the comparisons between administration formats with hypothesis testing (t and p values) and effect sizes (Cohen’s d and omega squared) with the RAN subtest removed and the new SRI included. See Feifer and PAR Staff (2021) for evidence of reliability and validity for the FAR SRI.

Table 1.4. Descriptive Statistics for FAR Screening Form Remote Test Scores by Administration Format

	Traditional in-person administration		Online remote administration		Total sample	
Subtest/index score	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Phonemic Awareness (PA)	102.39	17.74	98.84	16.05	100.61	16.95
Semantic Concepts (SC)	101.01	16.86	102.90	19.02	101.96	17.93
FAR Screening Remote Index (SRI)	102.14	14.86	101.33	15.87	101.74	15.32
<i>N</i>	70		70		140	

Note. All subtest and index scores are standard scores ($M = 100$, $SD = 15$).

Table 1.5. Significance and Effect Size of Administration Format on FAR Screening Form Remote Subtest and Index Scores

	Effect size			
Subtest/index	<i>t</i>	<i>p</i>	Cohen’s <i>d</i>	ω^2
Phonemic Awareness (PA)	-1.239	.217	0.204	.004
Semantic Concepts (SC)	0.621	.536	0.105	.004
FAR Screening Remote Index (SRI)	-0.313	.754	0.053	-.006

Note. A positive effect size indicates higher scores with traditional in-person administration ($N = 140$).



DISCUSSION

In this study, we aimed to examine the equivalence between traditional in-person administration and online remote administration of the FAR Screening Form. For the PA and SC subtests, there was no significant effect for administration procedure. As a result, the administration procedures for these subtests can be used interchangeably across all ages and grades, and the same norms can be used.

For the RAN subtest, there was a significant method effect; examinees evaluated in the traditional in-person format performed significantly better than those evaluated via the online remote format. For RAN, the two administration methods are not equivalent across the age span. As such, we don't recommend using the RAN subtest in the online remote format.

The present study suggests that the PA and SC subtests, when given in the remote, online format *in the specified, faithful procedure specifically evaluated in this study*, are generally equivalent, and examiners can use the norms of the traditional test. Given that PA and SC can be used interchangeably across administration formats, a new index was created for use with the FAR Screening Form Remote. This new screening index, the SRI, has demonstrated reliability and validity consistent with the FAR SI (see Feifer & PAR Staff, 2021).

These findings are also extremely consistent with current literature suggesting that children with reading disorders fall within two overarching camps: those with decoding and word identification issues and those with comprehension issues (Hulme & Snowling 2016; Snowling et al., 2020).

While phonological deficits are strongly associated with poor decoding skills, students with limitations in their core vocabulary development and general language skills often struggle with reading comprehension. For instance, 3-year-old preschool children with delayed language skills tend to have continued reading comprehension deficits at age 8 years (Hulme & Snowling, 2016).

With respect to phonological awareness, the FAR Screening Form Remote is systematically designed to measure a hierarchy of phonemic skills including the rhyming, blending, segmenting, and manipulation of sounds. The PA subtest is inclusive of tasks involving both phonemic synthesis and phonemic analysis. Phonemic synthesis is more of a "part-to-whole" cognitive construct and tends to develop before phonemic analysis, which involves the segmenting or breaking apart of the visual word form (Randazzo et al., 2019). The ability to disassemble words from a "whole-to-part" format represents a later stage in the phonemic awareness process, with multiple sensory modalities involved in the spatial manipulation of sounds within the printed word form (Feifer, in press; Paz-Alonso et al., 2018). The PA subtests on the FAR Screening Form Remote capture each of these phonemic processes.

Last, it's important to note that early language skills are critical in providing the foundation for decoding skills to emerge as well as the development of reading comprehension skills (Snowling et al., 2020). Therefore, language development skills should be included when devising an appropriate screening battery for dyslexia and reading disorders due to the symbiotic relationship between language and letter sounds. After all, the rapid recall of words depends, in part, on a student's overall phonemic proficiency (Kilpatrick, 2015), which is the cumulative amount of phonemic knowledge a student possesses. The FAR Screening Form Remote offers a reliable and valid measure of both phonemic knowledge and vocabulary knowledge to quickly determine students who may be at risk for reading impairments in a reliable, valid, and safe format.

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